

I claim:

- 1 1. A surgical probe for supplying energy to a body structure defining a
2 surface, the surgical probe comprising:
3 a relatively short shaft defining a proximal portion and a distal portion;
4 an electrode support member, defining a proximal portion and a distal
5 portion, associated with the shaft and movable relative to the shaft; and
6 an electrode, associated with the distal portion of electrode support
7 member, including an electrode main portion and an electrode needle portion
8 respectively constructed and arranged relative to one another such that the
9 electrode main portion will rest on the surface of body structure when the electrode
10 needle portion penetrates the body structure.
- 1 2. A surgical probe as claimed in claim 1, wherein at least a portion of
2 the relatively short shaft is malleable.
- 1 3. A surgical probe as claimed in claim 1, further comprising:
2 a steerable tip associated with the distal portion of the shaft and
3 adapted to bend relative to the shaft; and
4 a steering wire associated with the steerable tip and extending
5 proximally therefrom.
- 1 4. A surgical probe as claimed in claim 1, wherein the electrode support
2 member comprises a flexible electrode support member.
- 1 5. A surgical probe as claimed in claim 1, wherein the electrode support
2 member comprises a plurality of flexible support members and the electrode
3 comprises a plurality of electrodes respectively associated with the plurality of
4 electrode support members.

1 6. A surgical probe as claimed in claim 5, wherein at least a portion of at
2 least one of the electrode support members is formed from a shape memory
3 material.

1 7. A surgical probe as claimed in claim 1, wherein the electrode needle
2 portion is movable relative to the electrode main portion and the electrode support
3 member comprises a main support element on which the electrode main portion is
4 supported and a needle support element, movable relative to the main support
5 element, on which the electrode needle portion is mounted.

1 8. A surgical probe as claimed in claim 7, further comprising:
2 a handle, associated with the distal portion of the shaft, including a
3 first control element associated with the main support element and a second control
4 element associated with the needle support element.

1 9. A surgical probe as claimed in claim 1, wherein the electrode needle
2 portion is movable relative to the electrode main portion.

1 10. A surgical probe as claimed in claim 9, wherein the electrode main
2 portion defines an opening through which the electrode needle portion passes.

1 11. A surgical probe as claimed in claim 10, wherein the electrode main
2 portion is electrically connected the electrode needle portion.

1 12. A surgical probe for supplying energy to a body structure defining a
2 surface, the surgical probe comprising:
3 a shaft assembly defining a proximal portion and a distal portion; and
4 an electrode, associated with the distal portion of the shaft assembly,
5 including an electrode main portion and an electrode needle portion movable
6 relative to the electrode main portion.

1 13. A surgical probe as claimed in claim 12, wherein the shaft assembly
2 comprises a shaft and an electrode support member movable relative to the shaft
3 and the electrode is supported on the electrode support member.

1 14. A surgical probe as claimed in claim 13, wherein at least a portion of
2 the shaft is malleable.

1 15. A surgical probe as claimed in claim 13, wherein the shaft is relatively
2 short.

1 16. A surgical probe as claimed in claim 13, further comprising:
2 a steerable tip associated with the shaft and adapted to bend relative
3 to the shaft; and
4 a steering wire associated with the steerable tip and extending
5 proximally therefrom.

1 17. A surgical probe as claimed in claim 13, wherein the electrode
2 support member comprises a main support element on which the electrode main
3 portion is supported and a needle support element, movable relative to the main
4 support element, on which the electrode needle portion is mounted.

1 18. A surgical probe as claimed in claim 13, wherein the electrode
2 support member is flexible.

1 19. A surgical probe as claimed in claim 13, wherein the electrode
2 support member comprises a plurality of electrode support members and the
3 electrode comprises a plurality of electrodes respectively associated with the
4 plurality of electrode support members.

1 20. A surgical probe as claimed in claim 12, wherein the electrode
2 comprises a plurality of electrodes.

1 21. A surgical probe as claimed in claim 12, wherein the electrode main
2 portion defines an opening through which the electrode needle portion passes.

1 22. A surgical probe as claimed in claim 12, wherein the electrode main
2 portion is electrically connected the electrode needle portion.

1 23. A myocardial revascularization and denervation method, comprising
2 the steps of:
3 positioning an electrode on the epicardial surface of a ventricle; and
4 transmitting energy from the electrode, through the epicardial surface
5 and into the ventricular wall to create a lesion within the ventricular wall.

1 24. A method as claimed in claim 23, wherein the electrode includes an
2 electrode main portion and an electrode needle portion and the step of positioning
3 an electrode on the epicardial surface comprises positioning the electrode main
4 portion on the epicardial surface of the ventricle and piercing the epicardial surface
5 with the electrode needle portion such that the electrode needle portion is located
6 within the ventricular wall.

1 25. A method as claimed in claim 24, wherein the step of transmitting
2 energy from the electrode comprises transmitting energy from the electrode main
3 portion and the electrode needle portion.

1 26. A method as claimed in claim 23, wherein the step of positioning an
2 electrode on the epicardial surface of a ventricle comprises the step of introducing
3 the electrode thoracoscopically.

1 27. A method as claimed in claim 23, wherein the step of positioning an
2 electrode on the epicardial surface of a ventricle comprises positioning a plurality of
3 electrodes on the epicardial surface of the ventricle.

1 28. A method as claimed in claim 23, wherein the step of positioning an
2 electrode on the epicardial surface of a ventricle comprises positioning an electrode
3 shaped such that the lesion produced thereby will define a first region relatively
4 close to the epicardial surface with a relatively large cross-sectional area and a
5 second region relatively far from the epicardial surface with a relatively small cross-
6 sectional area.

1 29. A myocardial revascularization and denervation method for use on a
2 wall of the heart defining an epicardial surface and an endocardial surface, the
3 method comprising the steps of:
4 positioning a first lesion creation device on the epicardial surface;
5 positioning a second lesion creation device within the heart wall; and
6 forming a lesion with the first and second lesion creation devices.

1 30. A method as claimed in claim 29, wherein the step of positioning a
2 first lesion creation device on the epicardial surface comprises positioning an
3 electrode on the epicardial surface.

1 31. A method as claimed in claim 29, wherein the step of positioning a
2 second lesion creation device within the heart wall comprises positioning an
3 electrode within the heart wall.

1 32. A method as claimed in claim 29, wherein the step of forming a lesion
2 with the first and second lesion creation devices comprises forming a first lesion
3 portion having a first cross-sectional area and a second lesion portion having a
4 second cross-sectional area less than the first cross-sectional area.

1 33. A method as claimed in claim 32, wherein the step of forming a first
2 lesion portion comprises forming a first lesion portion that extends inwardly from the
3 epicardial surface towards the endocardial surface and the step of forming a
4 second lesion portion comprises forming a second lesion portion that extends
5 inwardly from the first lesion portion.

1 34. A method as claimed in claim 32, wherein the step of forming a lesion
2 with the first and second lesion creation devices comprises forming a lesion which,
3 when viewed in a cross-section taken in a plane perpendicular to the epicardial
4 surface, includes a first area that defines a border having a relatively smooth slope,
5 a second area that defines a border having a relatively smooth slope, and a abrupt
6 change in slope therebetween.

1